Original Article on Thoracic Surgery

Video-assisted thoracic surgery experience of calcified lymph nodes for lingular sparing lobectomy

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Contributions: (I) Conception and design: D Liu; (II) Administrative support: Q Ma; (III) Provision of study materials or patients: Q Ma; (IV) Collection and assembly of data: Q Ma; (V) Data analysis and interpretation: Q Ma; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

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Background: Video-assisted thoracic surgery (VATS) is commonly used for posterior, superior and lingular segmentectomy. Segmental resections involving the left upper lobe are the following: upper division (S1+2 and S3) (lingular sparing lobectomy), apicoposterior segmentectomy (S1 + S2), and lingulectomy (S4 + S5). Lingular sparing lobectomy is still a challenge for more technical demanding and more anatomic variations, especially when facing calcified lymph nodes.

Methods: A 73 years old woman was admitted for founding a ground glass opacity (GGO) during the screening test (1.0 cm × 1.0 cm). Her pulmonary function result was forced expiratory volume in 1 second (FEV_1): 1.51 L (54.7% predicted). She was a non-smoker, with negative bronchoscopy findings. She received general anesthesia with double-lumen endotracheal intubation and right lung ventilation. Right lateral decubitus position was chosen. The first 1.5-cm incision was selected in the 8th intercostal space in the midaxillary line, and was used for the camera. A 4-cm long incision was made in the 4th intercostal space in the preaxillary line. A third 1.5-cm incision was performed in the 9th intercostal space in the postaxillary line for assistant. Pulmonary ligament and the entire left hilum were mobilized. The superior pulmonary vein has usually three major tributaries. The superior branch drains the apicoposterior segments and frequently blocks the access to the apicoposterior arteries. The middle branch drains the anterior segment, and the lowermost branch drains the lingula. The lingular vein must be preserved. The apicoposterior and anterior segment vein was transected with a vascular stapler. Anterior pulmonary artery and anterior bronchus were then divided and stapled. The upper lobe bronchus splits immediately into the lingular bronchus and a common stem. All these segmental bronchi have short course and a calcified lymph node located between the apicoposterior pulmonary artery and apicoposterior bronchus. These situations make the dissection and identification very difficult. Following many failure attempts of trying take the calcified lymph node out. Staple the left apicoposterior pulmonary artery together with the apicoposterior bronchi is completed. And left upper division (S1+2 and S3) was taken out after stapling lung tissue above the level of lingular segment with a 60-mm green linear stapler. Mediastinal lymph nodes of level 9, 7, 4L and 5 were cleared afterwards.

Results: Pathology was confirmed with adenocarcinoma (ancinar component dominant). There were no complications and the patient was discharged 6 days postoperatively.

Conclusions: Staple the left apicoposterior pulmonary artery together with the apicoposterior bronchi is a safe and feasible way when facing the difficult dissection of the calcified lymph nodes during segmentectomy.

Keywords: Segmentectomy; video-assisted thoracic surgery (VATS); calcified lymph nodes

Received: 13 December 2015; Accepted: 21 January 2016; Published: 14 March 2016.
doi: 10.21037/jovs.2016.02.14
View this article at: http://dx.doi.org/10.21037/jovs.2016.02.14

Introduction

Lung cancer is the most commonly diagnosed cancer as well as the leading cause of cancer death in males worldwide (1). With the development of video-assisted thoracic surgery (VATS), segmentectomy has been adapted for thoracoscopic lung resection and has obtained worldwide acceptance (2-5). The incidence of lung adenocarcinoma is growing in recent years (6). And the 5-year survival is 100% for adenocarcinoma *in situ* (AIS), atypical adenomatous hyperplasia (AAH), minimally invasive adenocarcinoma (MIA) (7). VATS segmentectomy can preserve more pulmonary function and may be more suitable for these patients. Segmentectomy is commonly used for posterior, superior and lingular segmentectomy. Segmental resections involving the left upper lobe are the following: upper division (S1+2 and S3) (lingular sparing lobectomy), apicoposterior segmentectomy (S1 + S2), and lingulectomy (S4 + S5). However, lingular sparing lobectomy is still a challenge for more technical demanding and more anatomic variations, especially when facing calcified hilar lymph nodes. This report describes a minimally invasive technique for VATS lingular sparing left upper lobectomy.

Clinical summary

A 73 years old woman was admitted for founding a ground glass opacity (GGO) during the screening test (1.0 cm × 1.0 cm). Her pulmonary function result was forced expiratory volume in 1 second (FEV_1): 1.51 L (54.7% predicted). She was a non-smoker, with negative bronchoscopy findings. There were no positive past medical history and co-morbidities.

Pre-operative assessment

Standard lobectomy is associated with respiratory failure for elder patients with compromised pulmonary function. Segmentectomy was an alternative. This patient's lesion was located in the left upper lobe and was selected to be candidate for VATS segmentectomy. Preoperative workup included clinical history, physical examination, chest computed tomography (CT) scan with intravenous contrast no more than 1 month before resection, pulmonary function test, blood gas analysis, cardiac evaluation, bronchoscopy and basic examinations as usual. Abdominal B-ultrasound, cerebral magnetic resonance imaging (MRI) and isotopic bone scanning were examinations to exclude metastatic disease. Fluorodeoxyglucose-position emission tomography (FDG-PET) was employed to exclude N2 disease.

Figure 1 Video-assisted thoracic surgery (VATS) experience of calcified lymph nodes for lingular sparing lobectomy (8). Available online: http://www.asvide.com/articles/852

Anaesthesia and positioning

This patient received general anesthesia with double-lumen endotracheal intubation and right lung ventilation. Right lateral decubitus position was chosen. Her arms extended to 90° and the elbows flexed to 90°. And the operative table was flexed to maximize the intercostal space.

Technique

The first 1.5-cm incision was selected in the 8th intercostal space in the midaxillary line, and was used for the camera (30 degree 10 mm high definition video thoracoscope). A 4-cm long incision was made in the fourth intercostal space in the preaxillary line. A third 1.5-cm incision was performed in the ninth intercostal space in the postaxillary line for assistant (*Figure 1*).

First, pulmonary ligament and the entire left hilum was mobilized with combination of sharp and blunt dissection. Second, the superior pulmonary vein has usually three major tributaries. The superior branch drains the apicoposterior segments and frequently blocks the access to the apicoposterior arteries. The middle branch drains the anterior segment, and the lowermost branch drains the lingula. The lingular vein must be preserved. The apicoposterior and anterior segment vein was transected with a vascular stapler (45 mm tan tri-stapler). Third, anterior pulmonary artery and anterior bronchus were then divided and stapled. Injury of the adjacent structures like apical pulmonary artery, phrenic and recurrent laryngeal

nerves must be avoided during this step.

The upper lobe bronchus splits immediately into the lingular bronchus and a common stem. All these segmental bronchi have short course and a calcified lymph node located between the apicoposterior pulmonary artery and apicoposterior bronchus. These situations make the dissection and identification very difficult. Following many failure attempts of trying take the calcified lymph node out. Staple the left apicoposterior pulmonary artery together with the apicoposterior bronchi is completed. And left upper division (S1+2 and S3) was taken out after stapling lung tissue above the level of lingular segment with a 60-mm green linear stapler. Mediastinal lymph nodes of level 9, 7, 4L and 5 were cleared afterwards.

The specimen was removed with a bag. Bronchial stump was confirmed without air leakage by water test. Finally, a 32F chest tube was placed 1.5 cm incision (8^{th} intercostal space in the midaxillary line). Final pathology was confirmed with adenocarcinoma (ancinar component dominant), T1N0M0 stage IA.

Post-operative management

Chest X-ray showed left lingular segment and left lower lobe reexpanded. Analgesia, antibiotics are used for 2 days postoperatively. There were no complications and the patient was discharged 6 days postoperatively.

Comments

VATS lingular sparing lobectomy is safe and feasible for early stage lung adenocarcinoma, especially for elder patients with compromised pulmonary function. Staple the left apicoposterior pulmonary artery together with the apicoposterior bronchi is a safe and feasible way when facing the difficult dissection of the calcified lymph nodes during segmentectomy. However, control of the left main pulmonary artery is a recommendation before fire the stapler.

Acknowledgements

None.

doi: 10.21037/jovs.2016.02.14

Cite this article as: Ma Q, Liu D. Video-assisted thoracic surgery experience of calcified lymph nodes for lingular sparing lobectomy. J Vis Surg 2016;2:46.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The study was approved by the institutional ethical committee. Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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